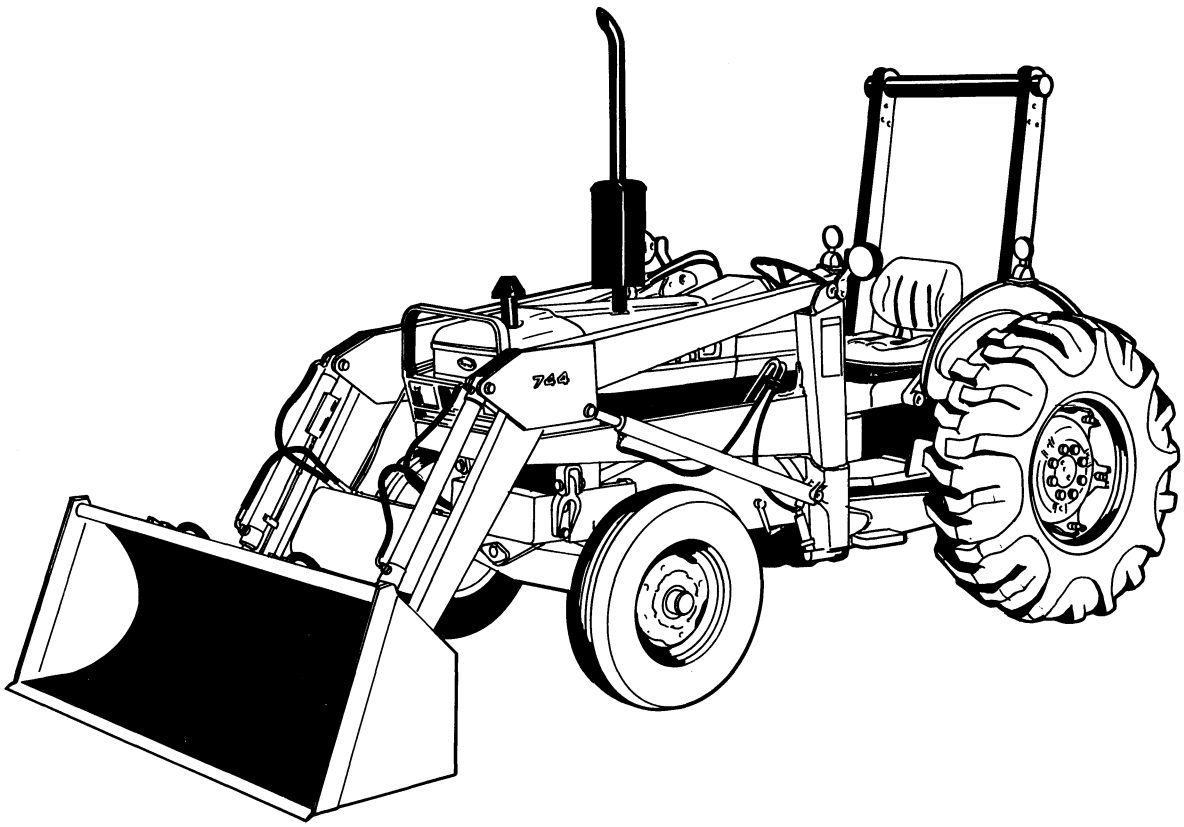
FORD

Service Manual

FORD
NEW HOLLAND

Series 744 Loader



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FOREWORD

This manual contains service information for the Ford Series 744 Loader. Detailed information is provided on description and operation, trouble shooting, tests and adjustments, component overhaul, lubrication and specifications.

Instructions for installing the loaders, loader components, or attaching kits are not covered in this manual. Refer to the appropriate Operator's Manual for detailed information.

When referring to the loader, all references to left and right are as viewed from the tractor operator's seat.

The service procedures in this manual are the most apparent, practical, and efficient methods; however, a procedure may not prove to be the most desirable in all situations. Alternate methods are sometimes required, depending upon the tools and equipment available.

Keep this manual, along with your other service literature, available for ready reference.

"Ford New Holland, Inc. whose policy is one of continuous improvement, reserves the right to make changes in design and specifications at any time without notice and without obligation to modify units previously built."

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SAFETY PRECAUTIONS

Practically all service work involves the need to drive the tractor. The Operator's Manual, supplied with each tractor, contains detailed safety precautions relating to driving, operating and servicing that tractor. These precautions are as applicable to the service technician as they are to the operator, and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or re-assembly operations, whether within a workshop facility or out "in the field," consideration should be given to factors that may have an effect upon safety, not only upon the mechanic carrying out the work, but also upon bystanders.

PERSONAL CONSIDERATIONS

- The wrong clothes or carelessness in dress can cause accidents. Check to see that you are suitably clothed. Some jobs require special protective equipment.

- **Skin Protection**
  Used engine oil may cause skin cancer. Follow work practices that minimize the amount of skin exposed and the length of time used oil remains on the skin.

- **Eye Protection**
  The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiseling, grinding, discing, welding, painting, etc.

- **Breathing Protection**
  Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.

- **Hearing Protection**
  Loud noise may damage your hearing and the greater exposure the worse the damage. If you feel the noise is excessive, wear ear protection.

- **Hand Protection**
  It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work clean your hands with soap and water. Solvents such as white spirit, paraffin, etc. may harm the skin.

- **Foot Protection**
  Substantial or protective footwear with reinforced toe-caps will protect your feet from falling objects. Additionally, oil-resistant soles will help to avoid slipping.

- **Special Clothing**
  For certain work it may be necessary to wear flame or acid-resistant clothing.

- Avoid injury through incorrect handling of components. Make sure you are capable of lifting the object. If in doubt get help.

EQUIPMENT CONSIDERATIONS

- **Machine Guards**
  Before using any machine, be sure the machine guards are in position and serviceable. These guards not only prevent body and clothing from coming in contact with the moving parts of the machine, but also ward off objects that might fly off the machine and cause injury.

- **Lifting Appliances**
  Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment than is necessary.

  Never stand under a suspended load or a raised implement.

- **Compressed Air**
  The pressure from a compressed air line is often as high as 100 psi (6.9 bar) 7 (kgf/cm²). It is perfectly safe if used correctly. Any misuse may cause injury.

  Never use compressed air to blow dust, filing, dirt, etc., away from your work area unless the correct type of nozzle is fitted.

  Compressed air is not a cleaning agent, it will only move dust, etc., from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears or skin.

- **Hand Tools**
  Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job, as this generally leads either to some injury, or to a poor job.

  Never use

  — A hammer with a loose head or split handle.
  — Spanners or wrenches with splayed or worn jaws.
  — Spanners or files as hammers; or drills, clevis pins or bolts as punches.

  For removing or replacing hardened pins use a copper or brass drift rather than a hammer.

  For dismantling, overhaul and assembly of major and sub components, always use the Special Service Tools recommended. They will reduce effort, labor and repair cost.

  Always keep tools clean and in good working order.

- **Electricity**
  Electricity has become so familiar in day to day usage that its potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

  Before using any electrical equipment — particularly portable applicances — make a visual check to make sure that the cable is not worn or frayed and that the plugs, sockets, etc., are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

- **Solvents**
  Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components such as seals, etc., and can cause skin irritation. Use only solvents that are suitable for the cleaning of components and parts, and that do not affect the personal safety of the user.

- **Housekeeping**
  Many injuries result from tripping or slipping over, or on, objects or material left lying around by a careless worker. Prevent these accidents from occurring. If you notice a hazard, don't ignore it — remove it.

  A clean, hazard-free place of work improves the surroundings and daily environment for everybody.

- **Fire**
  Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

  — Extinguish matches/cigars/cigarettes, etc., before throwing them away.
  — Work cleanly, disposing of waste material into proper containers.
  — Locate the fire extinguishers and find out how to operate them.
  — Do not panic — warn those near and raise the alarm.
  — Do not allow or use an open flame near the tractor fuel tank, battery or component parts.

- **First Aid**
  In the type of work that mechanics are engaged in, dirt, grease, fine dusts, etc., all settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may be found that a septic condition has formed within a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed, but it will take longer if you neglect it. Make sure you know where the First Aid box is located.

- **Cleanliness**
  Cleanliness of the tractor hydraulic system is essential for optimum performance. When carrying out service and repairs plug all hose ends and component connections to prevent dirt entry.

  Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high pressure washer or steam cleaner is recommended.

OPERATIONAL CONSIDERATIONS

- Stop the engine, if at all possible, before performing any service.

- Place a warning sign on tractors which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.

- Do not attempt to start the engine while standing beside the tractor or attempt to by-pass the neutral start switch.

- Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

- Always turn the radiator cap to the first stop to allow pressure in the system to dissipate when the coolant is hot.

- Never work beneath a tractor which is on soft ground. Always take the unit to an area which has a hard working surface — concrete for preference.

- If it is found necessary to raise the tractor for ease of servicing or repair, make sure that safe and stable supports are installed beneath axle housings, casings, etc., before commencing work.

- Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury. Do not use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks. Stop the engine and relieve the pressure before connecting or disconnecting oil lines. Tighten all connections before starting the engine or pressurizing the lines. If fluid is injected into the skin, obtain medical attention immediately or gangrene may result.

Safety precautions are very seldom the figment of someone's imagination. They are the result of sad experience, where most likely someone has paid dearly through personal injury.

Heed these precautions and you will protect yourself accordingly. Disregard them and you may duplicate the sad experience of others.

SERVICE TECHNIQUES

A. SERVICE SAFETY

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all machinery as well as the personal safety of the individual doing the work. This Shop Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

B. SERVICE TECHNIQUES

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhauled components being more reliable and efficient in operation.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to 'O' rings and cause skin irritation. Use solvents that are suitable for cleaning components and do not risk the personal safety of the user.

Replace 'O' rings, seals or gaskets whenever they are disturbed. Never mix new and old seals or 'O' rings, regardless of condition. Always lubricate new seals and 'O' rings with hydraulic oil before installation.

When replacing component parts use the correct tool for the job.

HOSES AND TUBES

Always replace hoses and tubes if the end connections are damaged.

When installing a new hose loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

The hoses are the arteries of the unit; be sure they are in good condition when carrying out repairs or maintenance, otherwise the machine's output and productivity will be affected.

After replacing a hose on a moving component be sure the hose does not foul by moving the component through the complete range of travel.

Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swaged position have failed, and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

BEARINGS

Bearings which are considered suitable for further service should be cleaned in a suitable solvent and immersed in clean lubricating oil until required.

Installation of a bearing can be classified in two ways: press fit on rotating parts such as shafts and gears, and push fit into static locations such as reduction gear housings. Where possible, always install the bearing onto the rotating component first.

DESCRIPTION AND OPERATION

DESCRIPTION AND OPERATION

The loader consists of a loader frame, lift arm assembly, double acting lift and bucket cylinders, control valve with float position, hydraulic pump and pump drive, hydraulic tubes and hoses and attaching hardware.

The Ford 744 loader, may be mounted on a Ford 250C or 260C tractor. Figure 1 illustrates the major load components.

LOADER FRAME

The loader frame for the Ford 744 loader is welded box type construction. Serviceable bushings are used in the loader lift arms and cylinders. The loader frame also acts as the hydraulic system reservoir. A hydraulic oil filter which has safety by-pass is located in the bottom of the left-hand loader frame post.

The loader frame is secured to the tractor at the rear axle and front axle support casting.

HYDRAULIC SYSTEM

The loader hydraulic system consists of a hydraulic pump, pump drive, loader control valve with float, hydraulic fluid reservoir and double acting lift and bucket cylinders. The hydraulic pump is mounted to the lower front support casting inside the radiator shell and is driven by the engine crankshaft.

The loader control valve incorporates double acting lift and bucket spools and a float mechanism. The valve is mounted to the right hand loader frame post and uses one control lever to actuate both the lift and bucket circuits. The return oil tube from the control valve is welded to the outside of the control valve mounting plate and at the loader frame side member. The loader frame

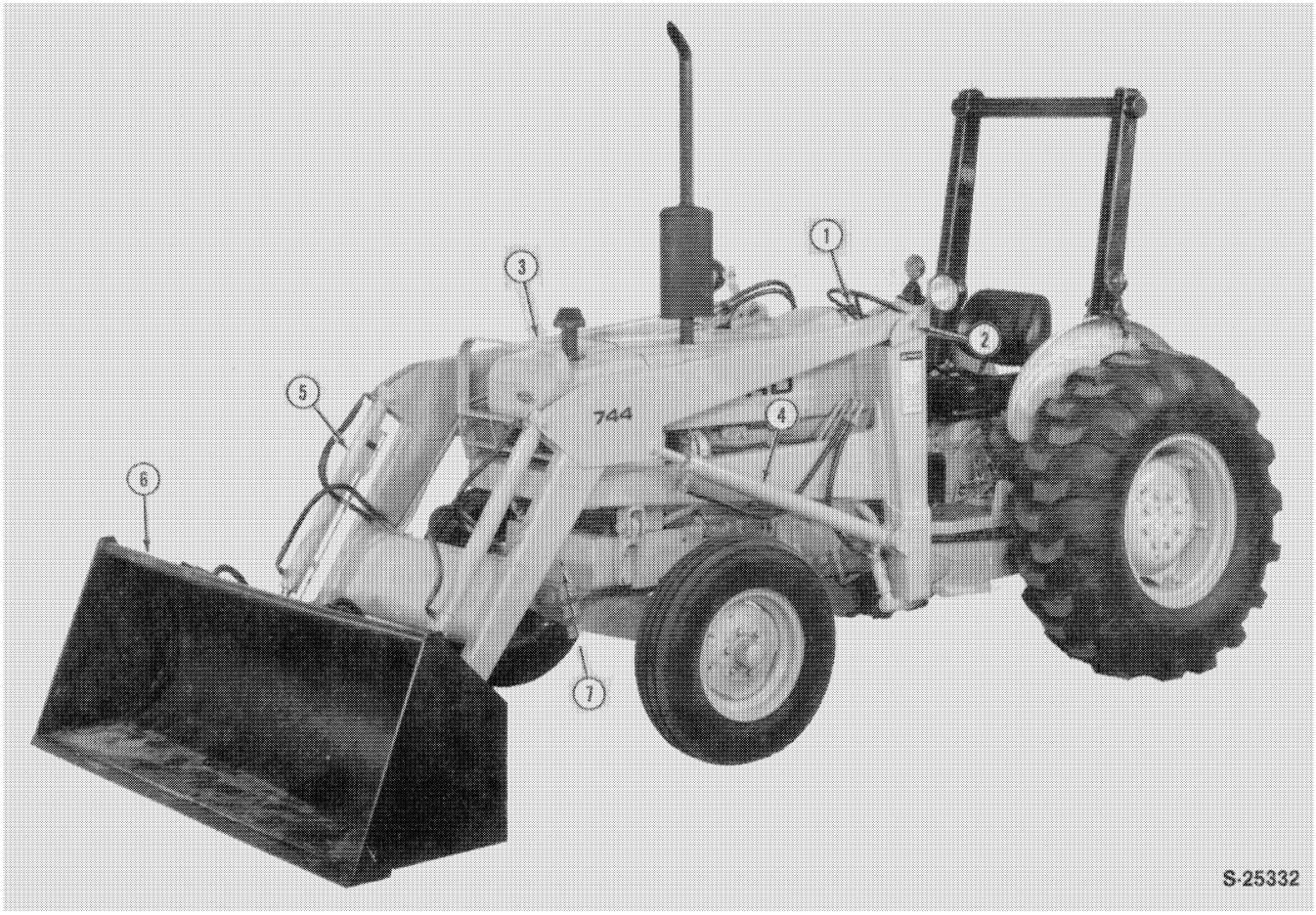


Figure 1
Loader Components

1. Control Valve
2. Loader Frame
3. Lift Arms
4. Lift Cylinders
5. Bucket Cylinders
6. Bucket
7. Hydraulic Pump Location

acts as the hydraulic fluid reservoir. The hydraulic oil filter, oil breather and dipstick are located at the left hand loader frame post. Oil is delivered to its destination through the use of steel tubing and hydraulic hoses. The lift cylinders are mounted with the piston end at the bottom of the loader frame post and the rod end at the loader lift arms. Bucket cylinders are mounted with the piston end at the lift arm gusset and rod end attached to the loader bucket.

When the tractor engine is running, the hydraulic pump draws oil from the reservoir and delivers it via steel tubing to the loader control valve which delivers the oil to the cylinders as desired.

HYDRAULIC PUMP

The gear type hydraulic pump is mounted in the front axle support and driven by a double universally jointed drive shaft connected to the engine crankshaft pulley, Figure 2.

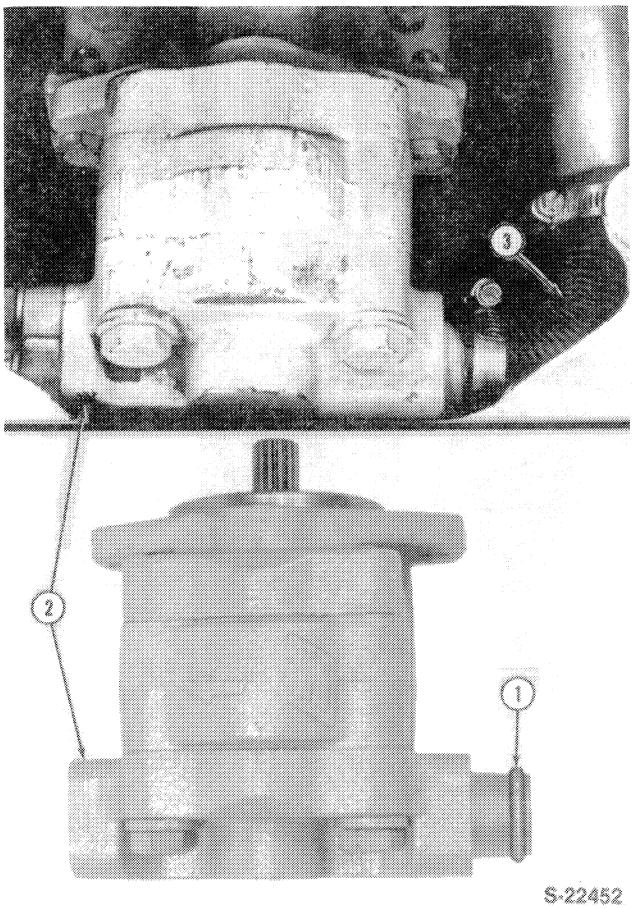


Figure 2
Hydraulic Pump Installation

1. Pump Inlet
2. Pump Outlet
3. Inlet Hose

Hydraulic oil is supplied to the pump by gravity feed from the hydraulic oil reservoir, through a hose which connects to the intake port in the pump cover. A set of spur gears, housed in the body of the pump and driven by the drive shaft, supply oil to the hydraulic system circuit.

Oil entering the pump fills the space between the teeth of the revolving gears and is then carried around within the pump body to a point where the teeth of the two gears come into mesh, Figure 3. As the oil cannot pass back between the gears it is forced out of the pump body through the outlet port in the pump cover.

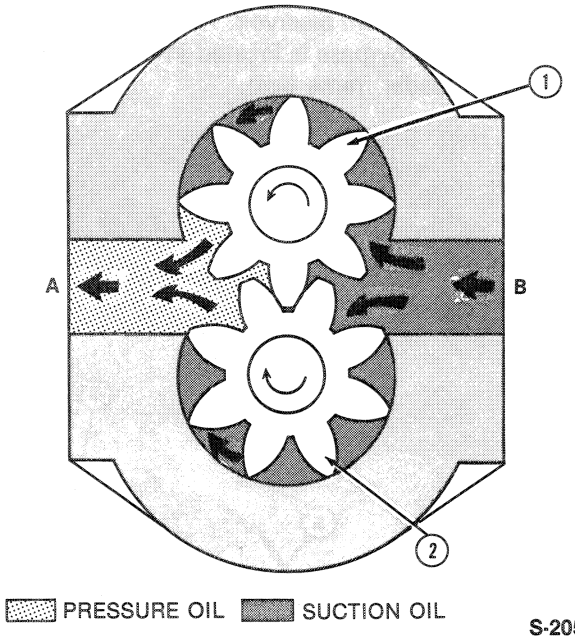


Figure 3
Oil Flow in Hydraulic Type Pump

A. To Hydraulic Circuit
B. From Reservoir
1. Driven Gear
2. Drive Gear

PUMP DRIVE SHAFT

Reference — Figure 4

The drive shaft flange bolts directly to the engine crankshaft pulley while the pump drive end has a splined coupler which prevents end thrust from damaging the pump. There are grease fittings on each of the pump drive shaft universal joints. See Operator's Manual for lubrication interval and grade.

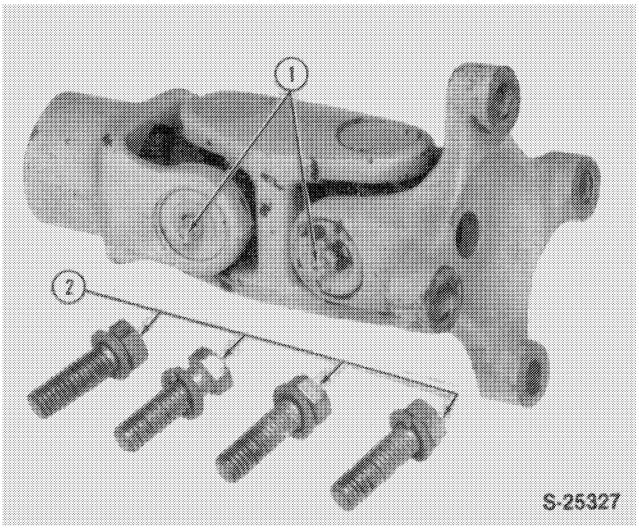


Figure 4
Drive Shaft Assembly
1. Lube Fittings 2. Mounting Bolts

CONTROL VALVE

Refer to the control valve exploded view, Figure 5, and the control valve assembly cutaway, Figure 6.

The control valve used on the 744 loader is a unit type valve with double acting lift and bucket spools. It also incorporates a "float" mechanism at the end of the lift spool. The double acting spools allow oil to travel to one end of a cylinder through one hose while oil being forced from the cylinders returns to the control valve through a separate hose. The position of the valve spool determines the direction of oil flow.

The cast iron control valve body houses all of the valve components and acts as an attaching point for the hydraulic tubes. The valve is bolted to a mounting bracket which is welded to the right hand loader frame post. The valve spools (14 and 15), Figure 5, are constructed of high carbon, ground, polished and chrome plated steel. The centering springs (9) and spring collars (8) are secured by screws at the ends of the spools and function to return the spools to the neutral position.

Each valve spool is selectively fitted to its respective spool bore. Because of the selective fitting, the spools cannot be serviced separately. If the spools are damaged, the control valve must be replaced as an assembly.

Float Mechanism:

The control valve is equipped with a float mechanism at the spring end of the lift spool. Figure 7 shows an exploded and sectional view of the float assembly. In operation, the float detent is engaged by moving the control lever to the full forward position. During float, the loader bucket will rest on the ground and follow the contour of the working surface. Hydraulic oil flows freely in and out of the cylinders as conditions demand.

When the lift spool is moved to the "float" position, the sleeve (6) at the end of the lift spool is pushed past the four piece lock ring (5) and compresses the spring washers (3). A shoulder on the sleeve catches against the ring and the spring washer keeps tension on the spool so that it will stay in the detent position. To release the float detent, the lift spool must be manually moved back to the neutral position.

Check Valves:

Check valves (15) are located in both high pressure passages of the control valve, Figure 6. When a hydraulic cylinder is under load and a valve spool is moved to actuate the cylinder, there would be a momentary tendency for oil to flow in the opposite direction. The check valves keep the circuits closed until there is sufficient flow and pressure to overcome the load in the cylinders. Figure 8 is an exploded view of the check valve components.

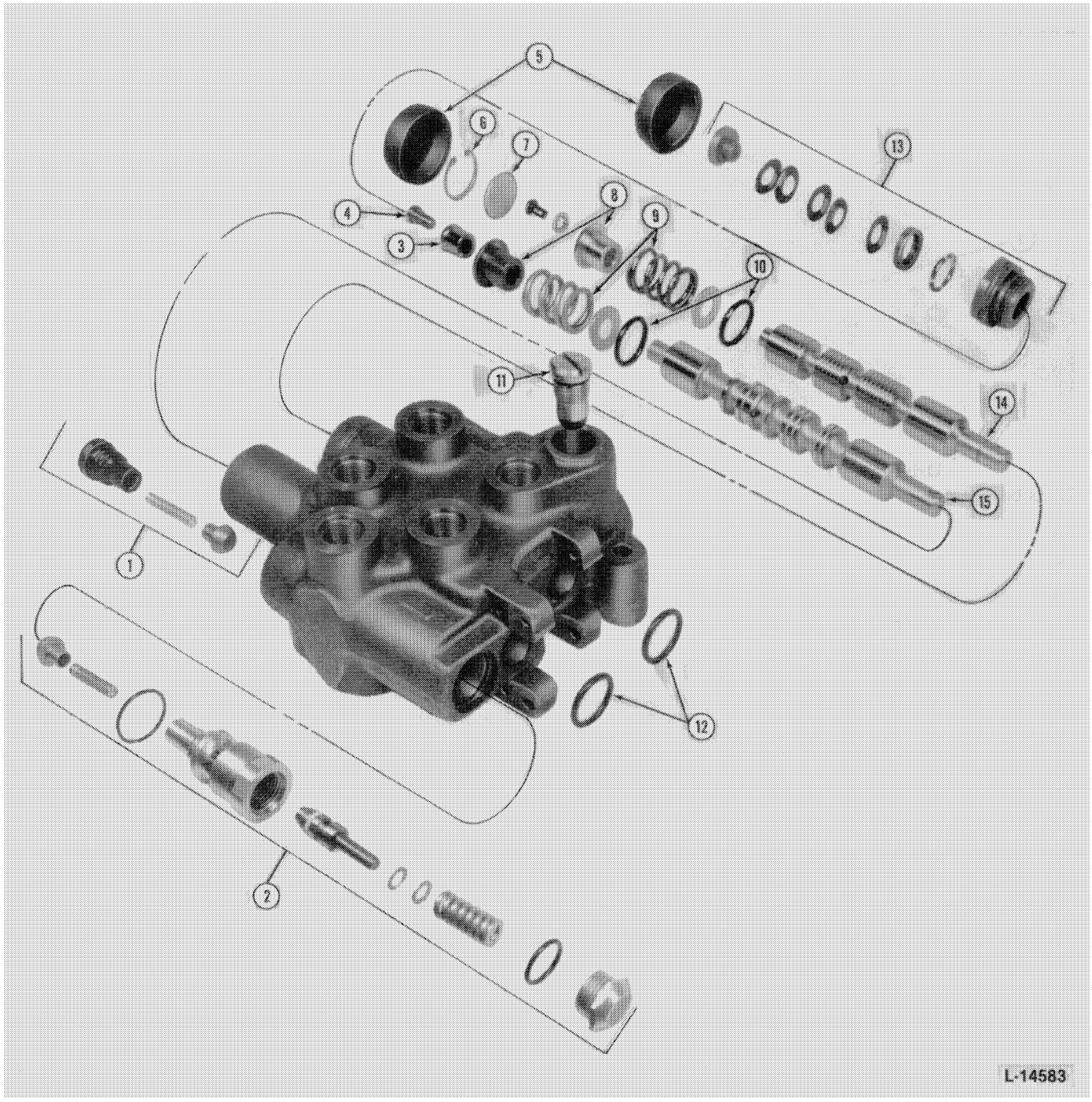


Figure 5
Control Valve — Exploded View

1. Check Valve Assembly
2. System Relief and Check Valve Assembly
3. Detent Sleeve
4. Spool Retaining Screw
5. Rubber Spool End Caps
6. Snap Ring
7. Spool End Cap
8. Spring Collars
9. Spool Centering Springs
10. Spring End Spool Seals
11. Anti-Cavitation Valve
12. Eyelet End Spool Seals
13. Float Detent Assembly
14. Bucket Spool
15. Lift Spool

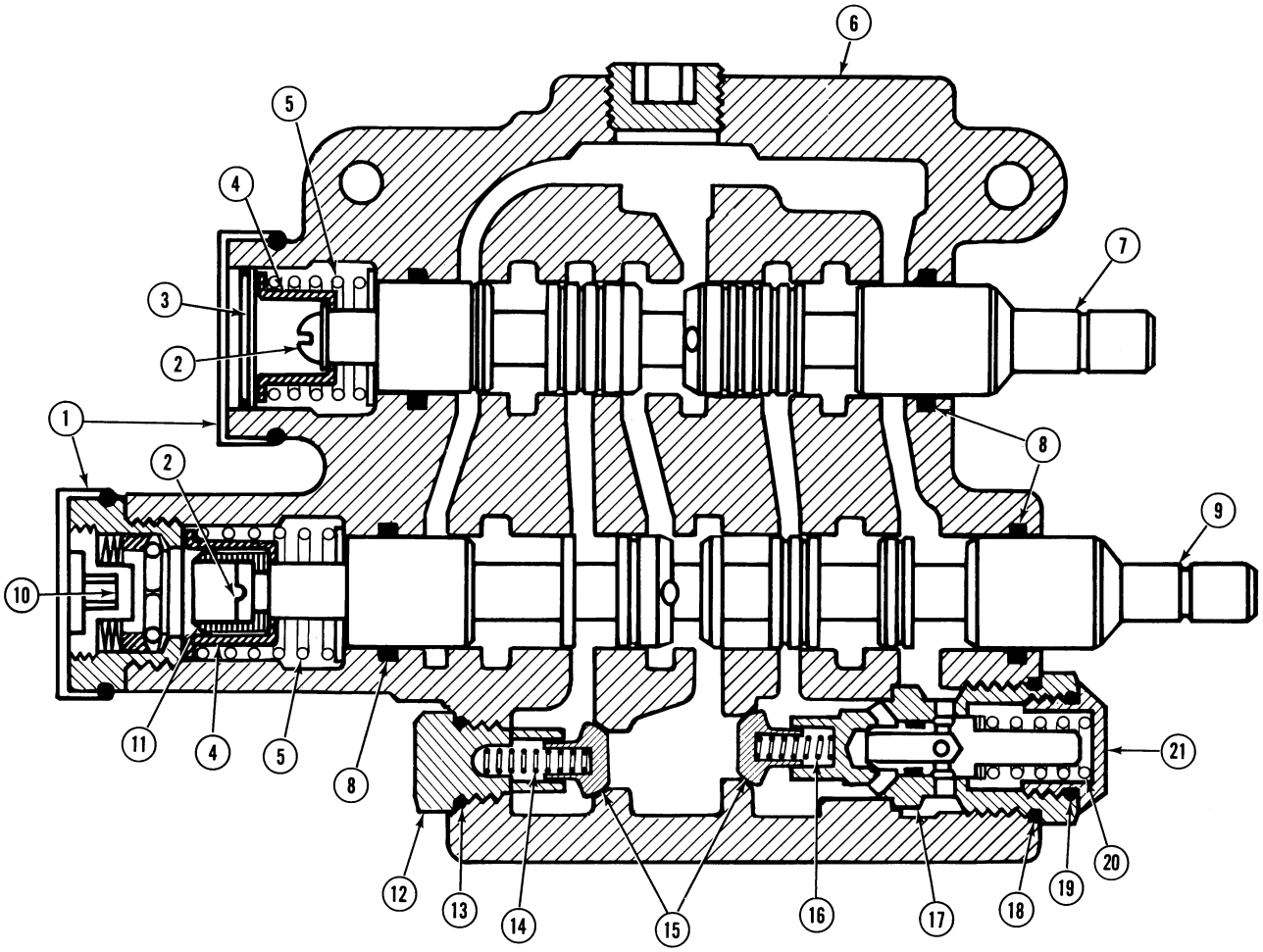


Figure 6
Control Valve Cutaway

1. Rubber Spool End Caps
2. Centering Spring Retaining Screws
3. Snap Ring and End Cap
4. Centering Spring Collars
5. Spool Centering Springs
6. Control Valve Body
7. Bucket Spool
8. Spool Seals
9. Lift Spool
10. Float Detent Assembly
11. Detent Sleeve
12. Check Valve Plug
13. O-Ring
14. Check Valve Spring
15. Check Valve Poppets
16. Check Valve Spring
17. System Relief Valve Body
18. O-Ring
19. 0-Ring
20. Relief Valve Spring
21. Relief Valve Cap

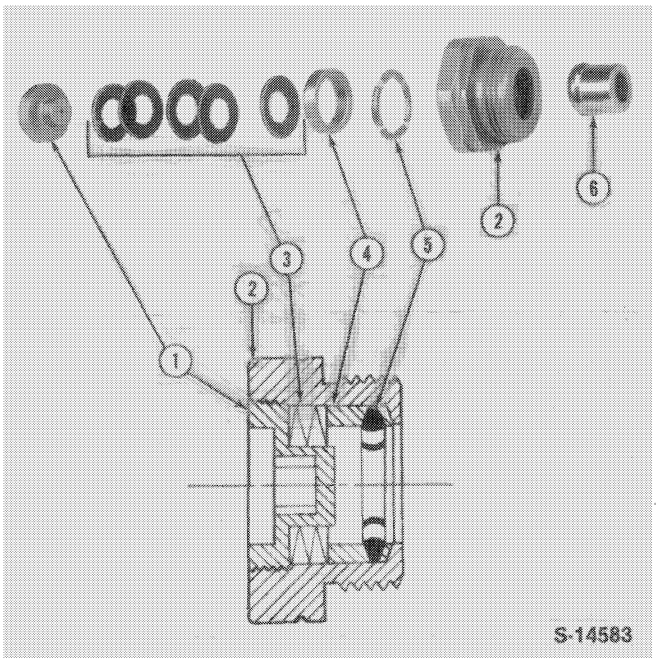


Figure 7
Float Detent Assembly

1. Adjustment Plug
2. Body Plug
3. Spring Washers
4. Spacer
5. Four Piece Lock Ring
6. Detent Sleeve (Attaches to Lift Spool)

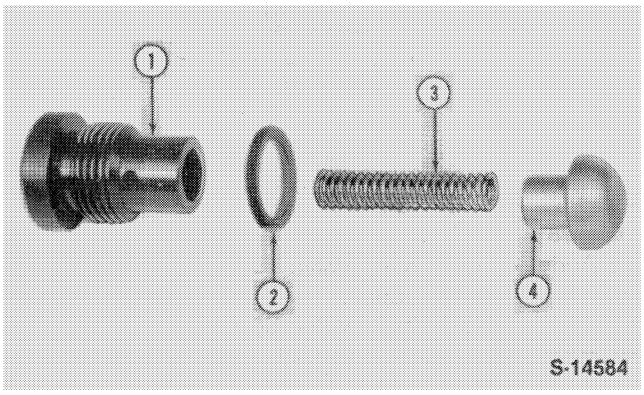


Figure 8
Spring End Check Valve Assembly

1. Plug
2. O-Ring
3. Spring
4. Poppet

System Relief Valve:

The system relief valve, Figure 9, is located between the high pressure passage and low pressure passage of the control valve.

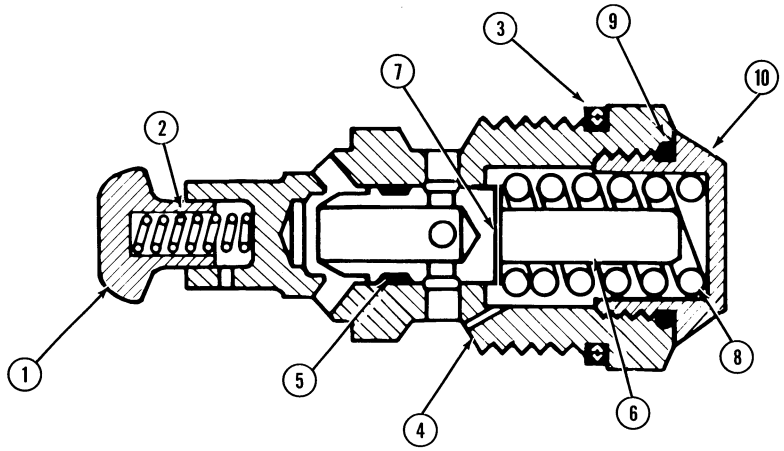
When a spool is moved, oil is directed to one end of the cylinder. If the cylinder stalls, is restricted, or reaches the end of its stroke, oil pressure builds in the system. To protect against this pressure increase, the relief valve opens and allows high pressure oil to return to sump.

In operation, oil entering the inlet port of the control valve is normally maintained below the pressure required to unseat the relief valve poppet (7). When the system pressure exceeds the setting of the relief valve, the poppet unseats allowing oil to flow through the relief valve to sump as shown. As system pressure decreases, the spring (9) forces the poppet back onto its seat. The hydraulic oil then resumes its normal flow.

Anti-Cavitation Valve:

The anti-cavitation valve, Figure 10, is located between the bucket cylinder piston end port (4) and the return oil passage (5). During the dump cycle, oil can be forced out of the rod end of the cylinder faster than the pump can supply oil to the piston end of the cylinder. A void will be formed in the piston end of the cylinder if oil supply is not sufficient. To supplement pump oil, return oil is recycled to the cylinder piston end port.

In operation, the valve functions when oil leaving the cylinder rod ends exceeds the pumped oil supply. Because a void is being created in the piston end of the cylinder, the low pressure oil in the return passage (5) is sufficient to unseat the check ball (3) allowing oil to flow to the cylinder piston end port (4).



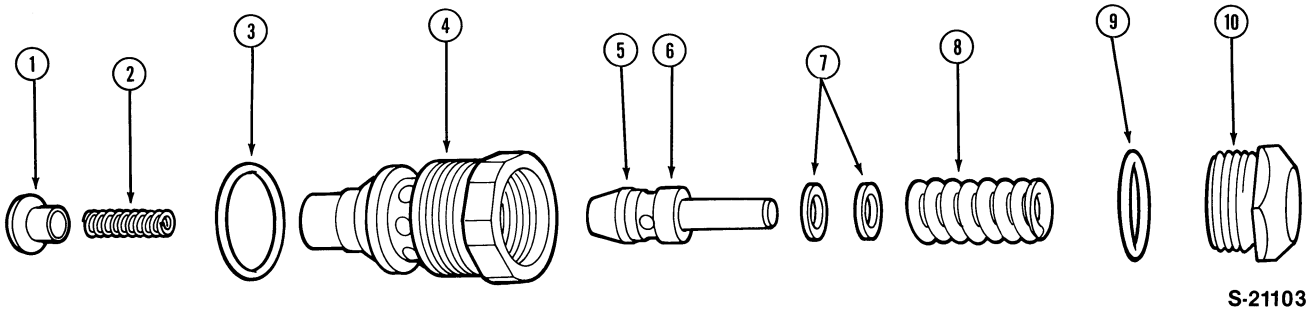


Figure 9
System Relief Valve Assembly

1. Check Valve Poppet
2. Check Valve Spring
3. O-Ring Seal
4. Relief Valve Body
5. Poppet Seal Ring
6. Poppet
7. Shim Pack
8. Adjusting Spring
9. O-Ring
10. Cap

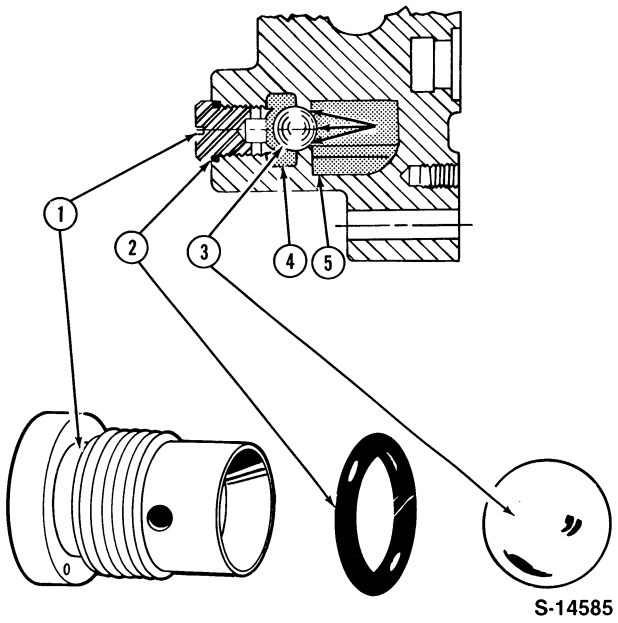


Figure 10
Anti-Cavitation Check Valve

1. Plug
2. O-Ring
3. Check Ball
4. Bucket Spool Piston End Port
5. Return Oil Passage

CYLINDERS

Double acting lift and bucket cylinders are used on all Ford 744 loaders. Refer to Figures 11 and 12.

Cylinder barrels are fabricated from tubing with smooth bore finish to prolong seal life. The piston rod and barrel trunnions are arc welded in place.

Cylinder rods are made of high-tensile steel and chrome plated. Pistons are retained on the rod by use of a large bolt.

The cylinder gland has "V-Flared" rod seal and rod wiper seal. Sealing between the gland and cylinder barrel is accomplished by use of an O-ring and back-up washer. A special spiral retaining wire holds the gland in place in the cylinder barrel.

The one-piece piston uses a seal and seal expander. The seal expander maintains pressure on the piston seal for a more positive barrel wall seal and prevents oil transferring to the low pressure side of the piston.

The double-acting cylinders, Figures 11 and 12, have oil ports on both sides of the piston. Pump oil is directed to one end of the cylinder and oil is allowed to flow from the other end to the reservoir. When the control valve spool is in the neutral position (closed) the oil is trapped in both ends of the cylinders.

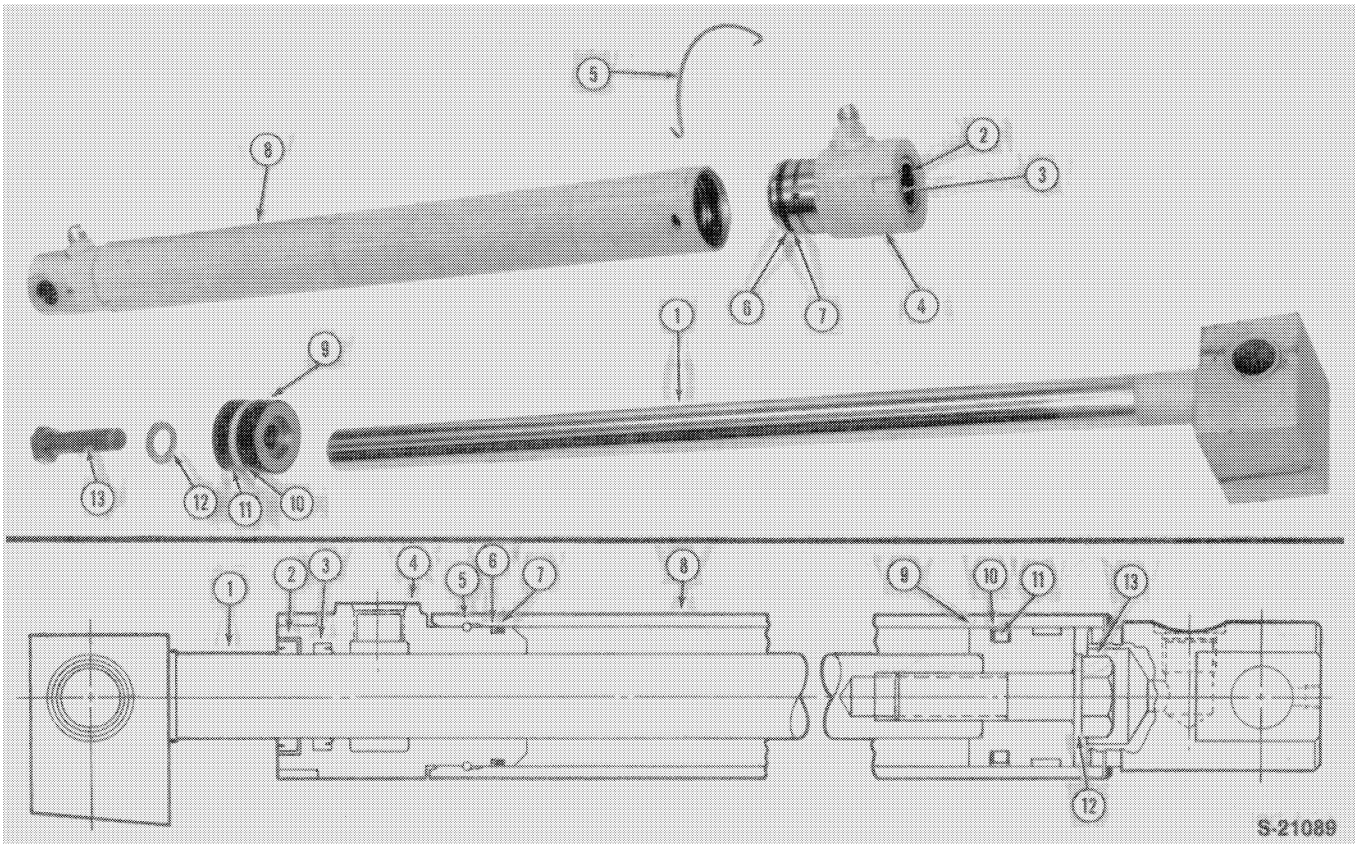


Figure 11
Loader Bucker Cylinder

1. Cylinder Rod
2. Gland-Wiper Seal
3. Gland-Rod Seal
4. Gland
5. Gland-Retaining Wire
6. Gland-Back-up Washer
7. Gland-O-Ring
8. Cylinder Barrel
9. Piston
10. Piston Seal
11. Piston Seal Expander
12. Flat Washer
13. Piston Retaining Bolt

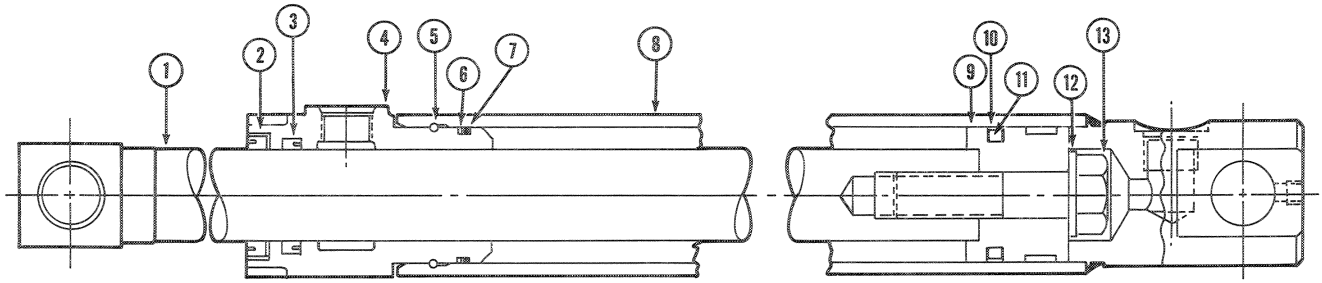


Figure 12
Loader Lift Cylinder

1. Cylinder Rod
2. Gland-Wiper Seal
3. Gland-Rod Seal
4. Gland
5. Gland-Retaining Wire
6. Gland-Back-up Washer
7. Gland-O-Ring
8. Cylinder Barrel
9. Piston
10. Piston Seal
11. Piston Seal Expander
12. Flat Washer
13. Piston Retaining Bolt

GENERAL OIL FLOW

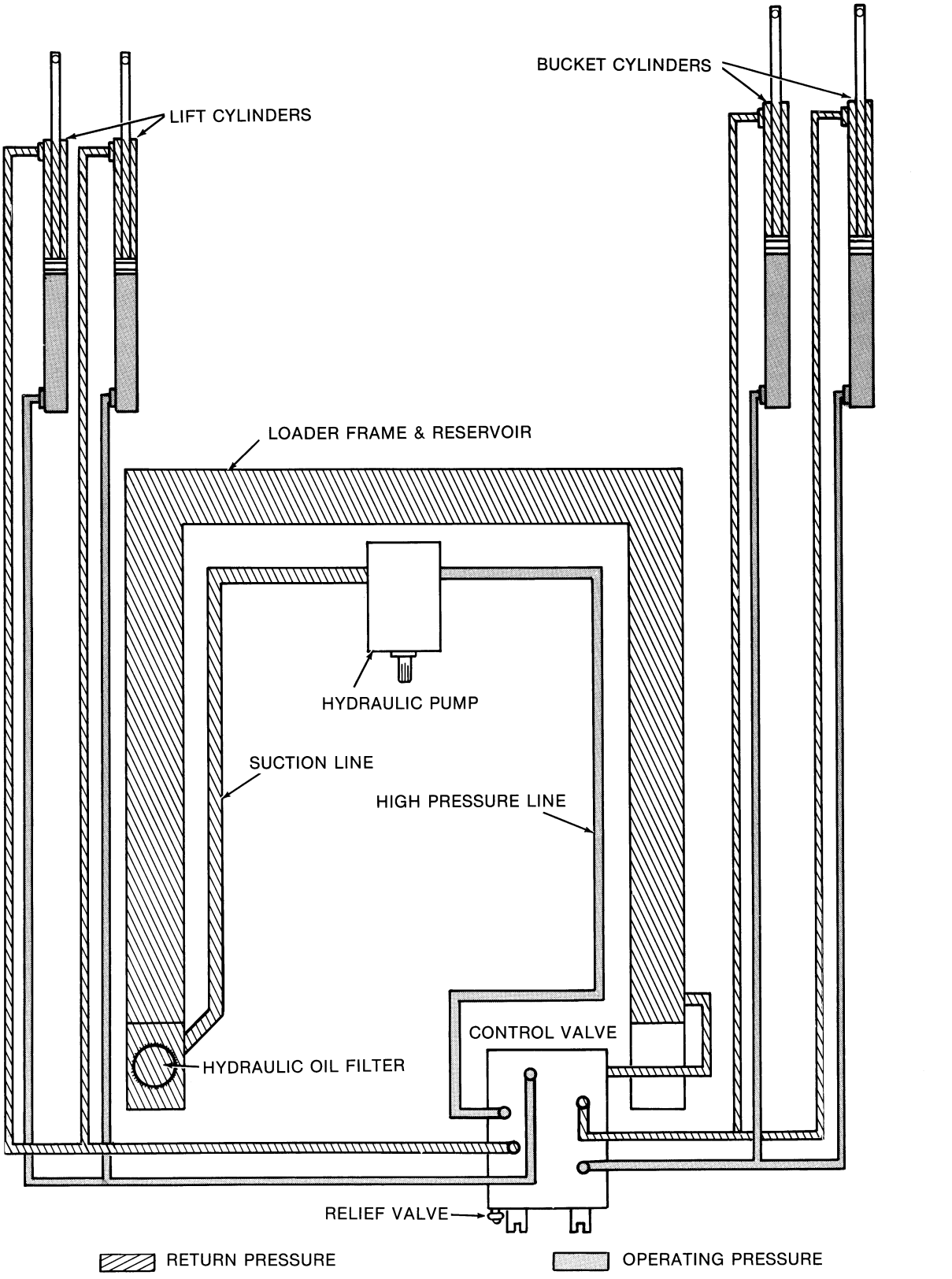


Figure 13
Oil Flow Schematic

GENERAL OIL FLOW

Figure 13 illustrates the flow of hydraulic oil through the loader hydraulic system.

The oil for the loader system is stored in the hydraulic reservoir. Oil flows to the externally mounted hydraulic pump from the reservoir. Oil is then pumped to the loader control valve where the direction of the flow is determined by the position of the valve spools. With the spools in the neutral position, the oil flows through the control valve and directly back to the reservoir. As the control lever is activated, the valve spools function to direct oil to and away from the cylinders. All oil returning from a cylinder flows through the control valve and back to the hydraulic reservoir. All oil flows through the hydraulic oil filter before being delivered to the pump.

CONTROL VALVE — NEUTRAL

Figure 14 illustrates a sectional view of the control valve with the valve spools in the neutral position. Pumped oil enters the valve at the inlet and flows through the open center, past the spools to the oulet as shown. Oil in the cylinders is trapped because of the closing of the passages by the control valve spools.

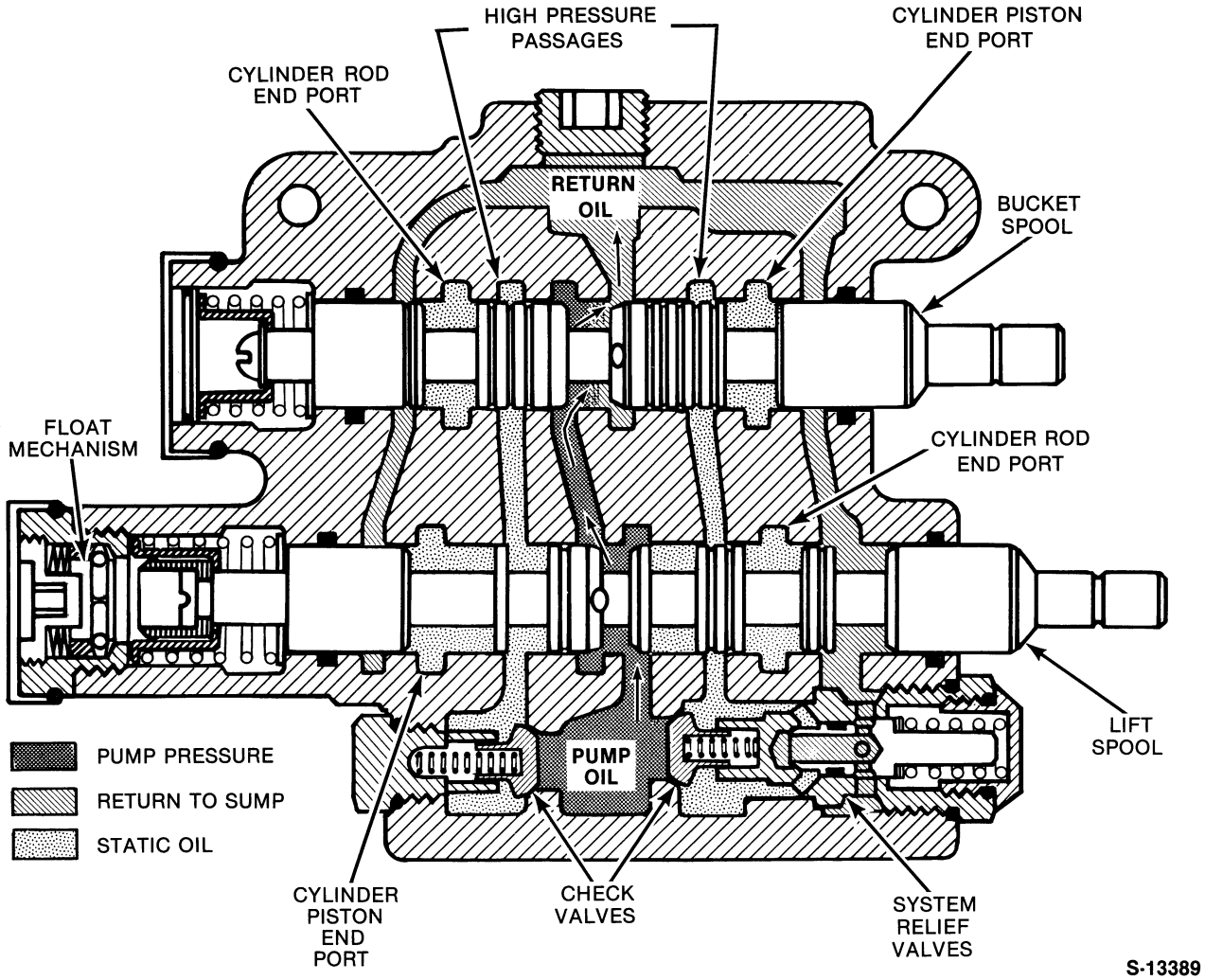


Figure 14
Control Valve — Neutral

GENERAL OIL FLOW

LIFT SPOOL — EXTENDING

Figure 15 illustrates oil flow through the control valve with the lift spool moved to direct oil to the piston end of the lift cylinders. Oil entering the valve at the inlet port is blocked by the positioning of the spool land, causing a pressure increase. As pressure builds, the check valves are unseated allowing oil to flow through the high pressure passages to the cylinder piston end port. Return oil from the cylinder rod port enters the valve and flows to sump as shown.

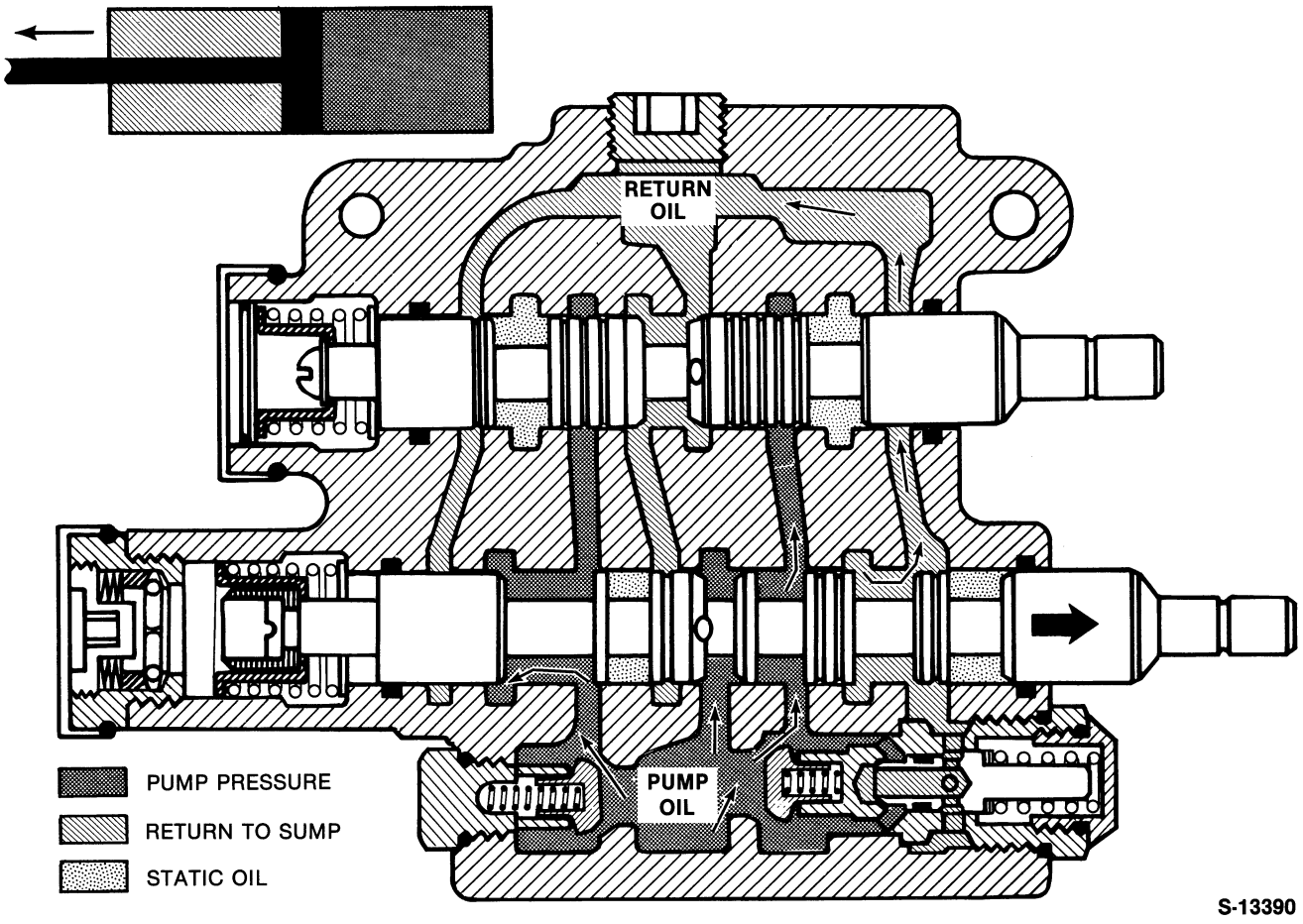


Figure 15
Lift Spool — Extending

LIFT SPOOL — RETRACTING

Figure 16 illustrates oil flow through the control valve with the lift spool moved to direct oil to the rod end of the lift cylinder. Oil entering the valve at the inlet port is blocked by the positioning of the spool land causing a pressure increase. As pressure builds, the check valves are unseated allowing oil to flow to the high pressure passages to the cylinder rod end port. Return oil from the cylinder piston end port enters the valve and flows to sump as shown.

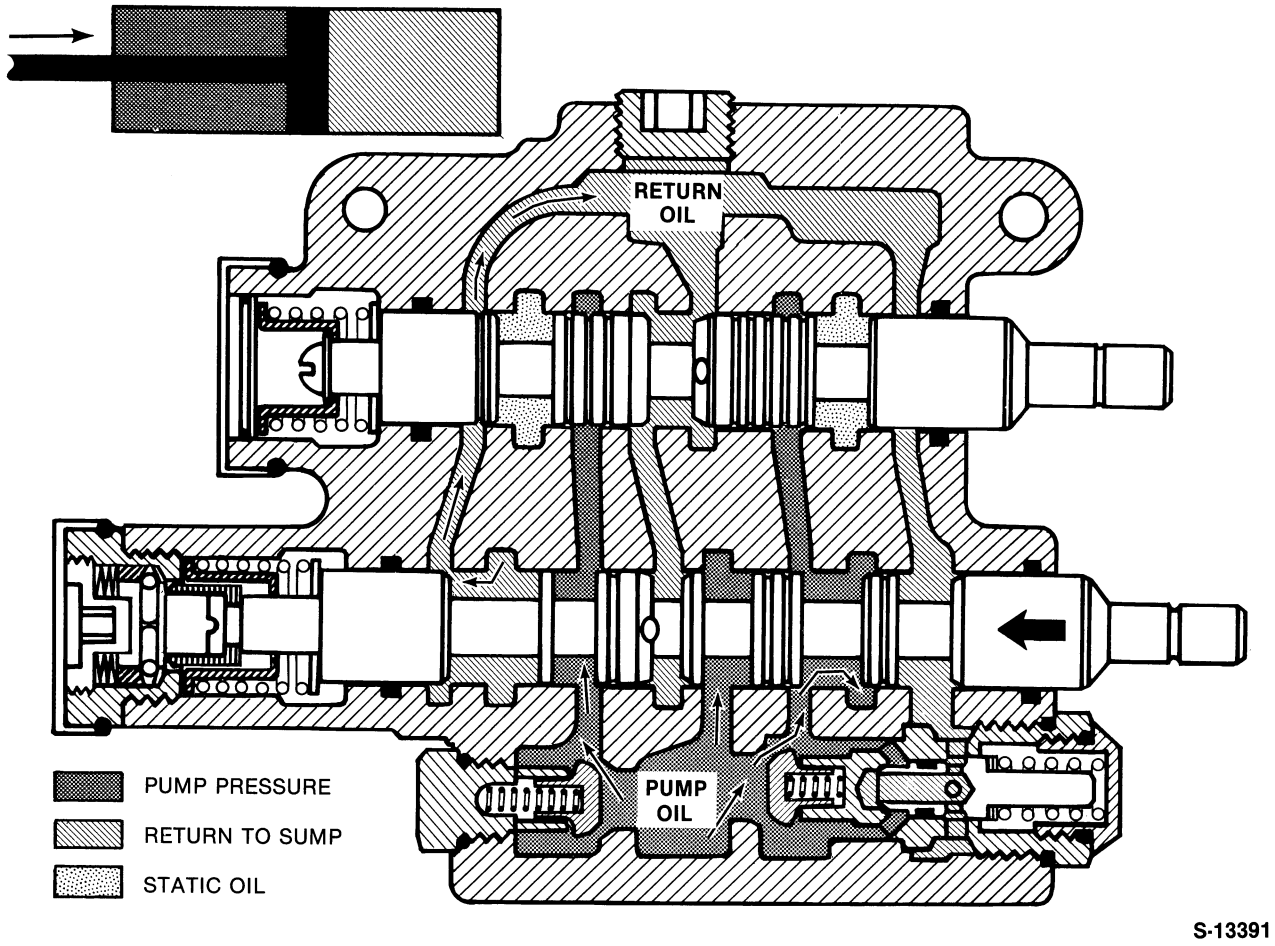


Figure 16
Lift Spool — Retracting

LIFT SPOOL — FLOAT POSITION

When the lift spool, Figure 17, is moved completely left, the detent mechanism engages to hold the spool in this position. The positioning of the spool allows pumped oil to pass through the open center of the control valve. During operation, the loader bucket will follow the ground contour or "float." Oil will flow in and out of the lift cylinder ports as conditions demand.

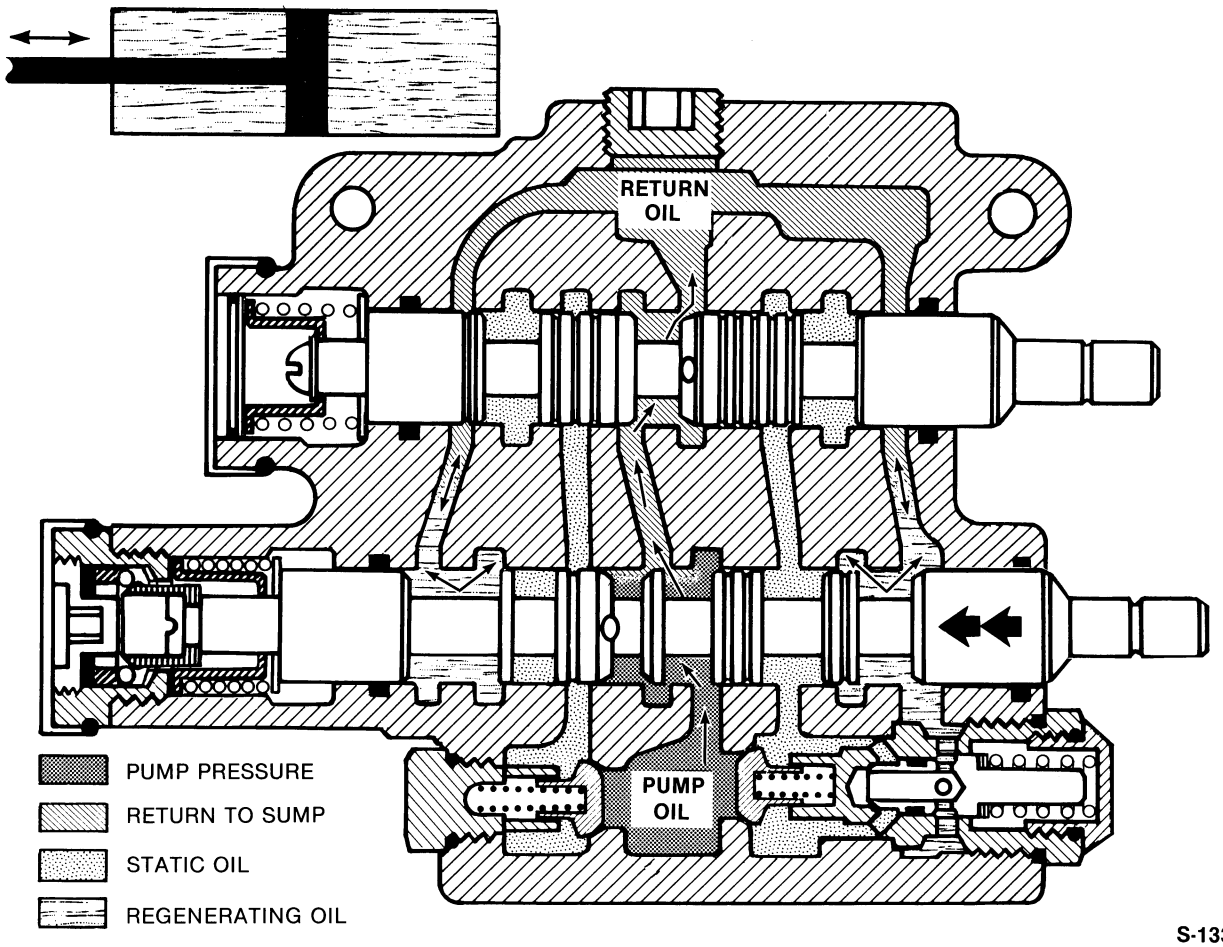


Figure 17
Lift Spool — Float

BUCKET SPOOL — EXTENDED

Figure 18 illustrates oil flow through the control valve with the bucket spool positioned to direct oil to the piston end of the bucket cylinders. Oil entering the valve at the inlet port passes through the open center of the lift spool, but is blocked off by the positioning of the bucket spool lands. As pressure builds, the check valves are unseated allowing oil to flow into the high pressure passages to the cylinder piston end port. Return oil from the cylinder rod end port enters the valve and flows to sump as shown.

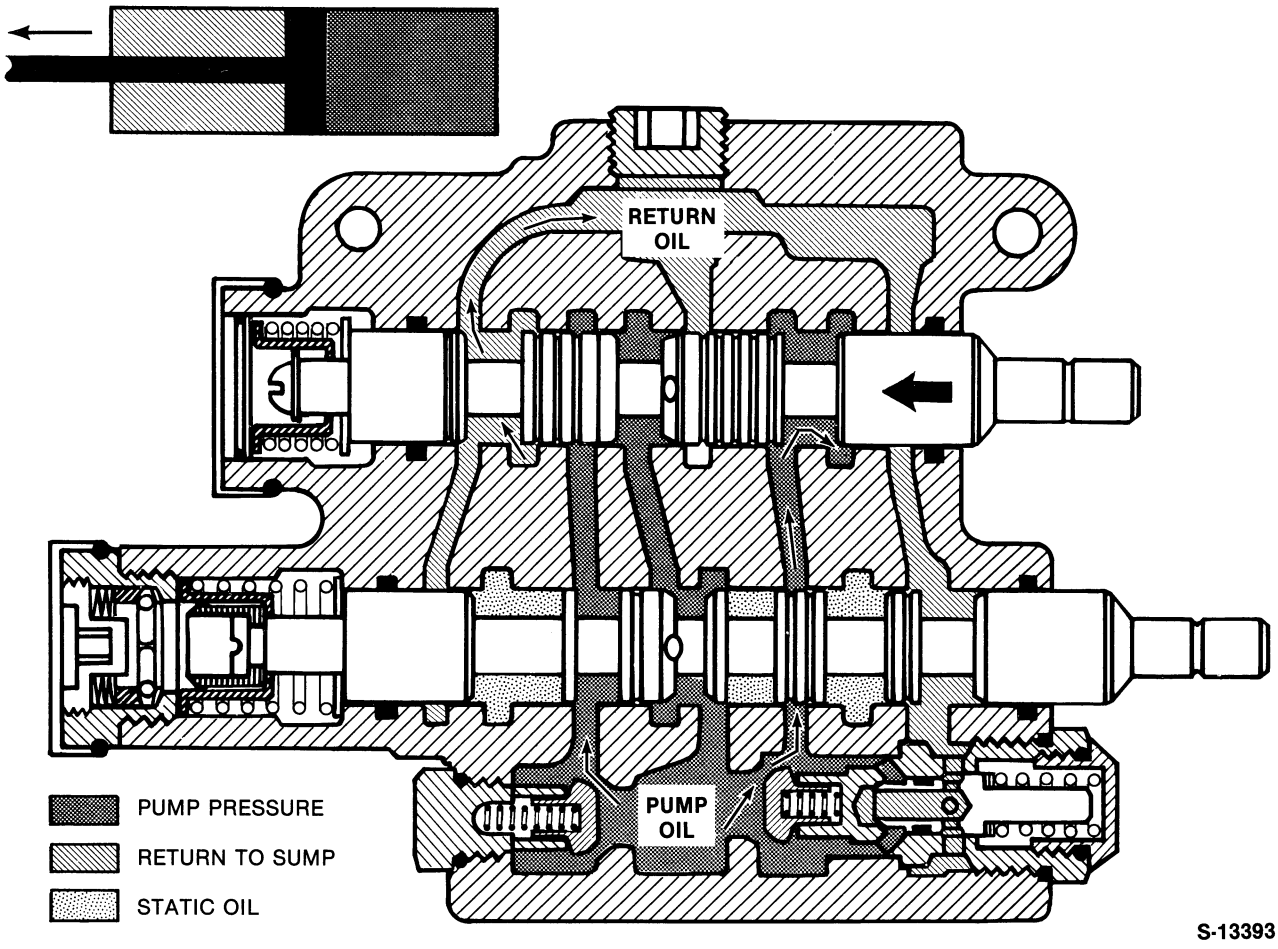


Figure 18
Bucket Spool — Extending

BUCKET SPOOL — RETRACTING

Figure 19 illustrates oil flow through the control valve with the bucket spool positioned to direct oil to the rod end of the bucket cylinders. Oil entering the valve at the inlet port passes through the open center of the lift spool, but is blocked off by the positioning of the bucket spool lands. As pressure builds, the check valves are unseated allowing oil to flow into the high pressure passages to the cylinder rod end port. Return oil from the cylinder piston end port enters the valve and flows to sump as shown.

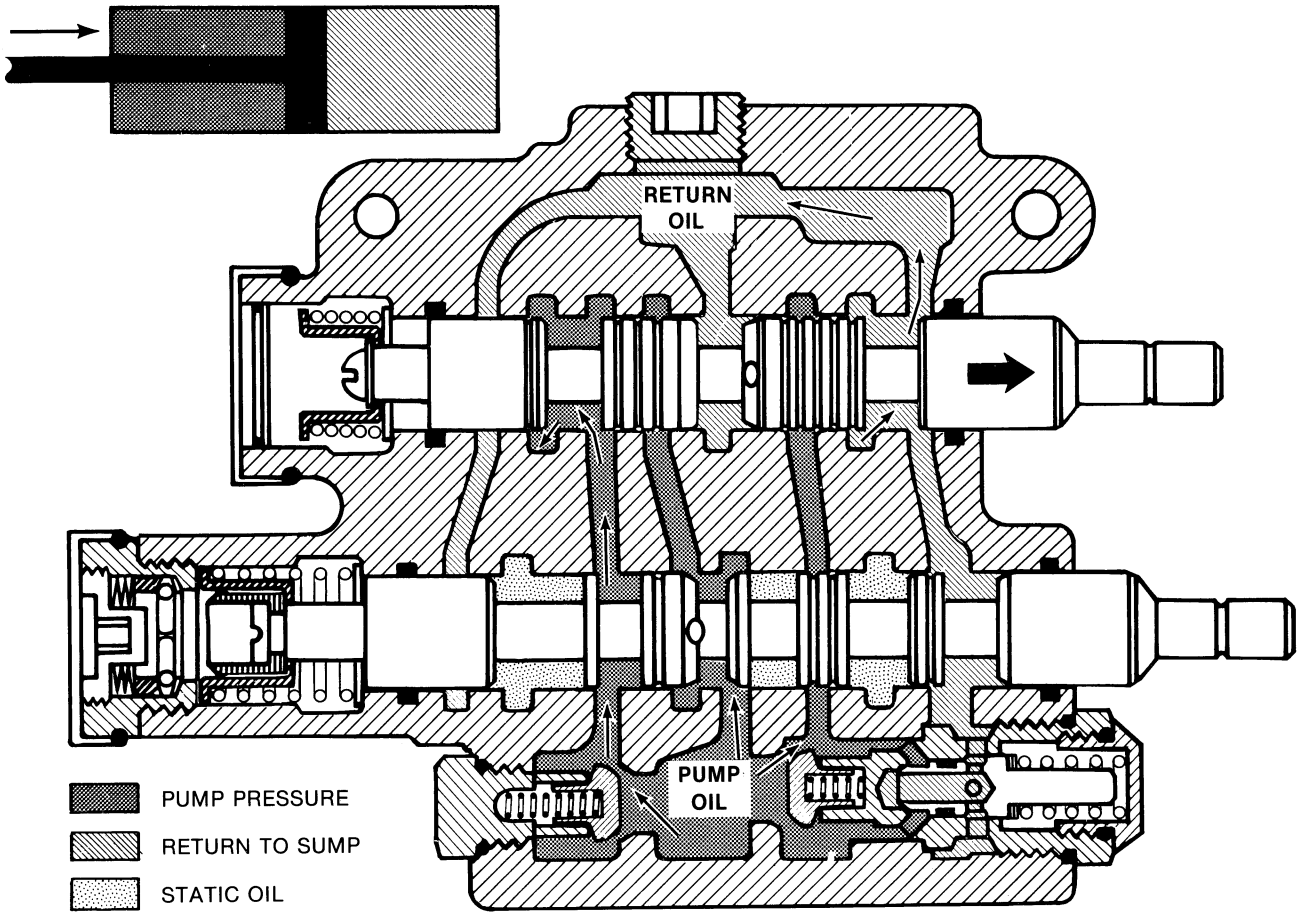


Figure 19
Bucket Spool — Retracting

TROUBLE SHOOTING

This portion of the manual is devoted to trouble shooting loader malfunctions. If trouble shooting is approached in a systematic manner, the malfunction can be diagnosed quickly and accurately. Follow the step-by-step procedures outlined below.

1. As a first step in the trouble shooting procedure, several preliminary checks should be made. These checks are essential in that once performed they need no longer be considered as a possible cause of the immediate malfunction.

   - Check for proper loader installation.
   - Check oil level.
   - Check for external oil leaks.
   - Check for external mechanical damage such as kinked hoses or tubes, damaged cylinders, bent or binding structural members.
   - Perform the system relief valve pressure check and adjust if necessary.

   If the pressures cannot be adjusted to specifications, refer to Step 2, below. Having performed the preliminary checks and failing to locate the cause of the malfunctioning, the following procedures should be used.

2. If possible, operate the loader and make note of the operating characteristics. Cycle the control lever to operate each of the cylinders to both the extended and retracted positions.

Compare the operating characteristics observed in Step 2, above, with the problems listed in the Trouble Shooting Table.

- The column labeled "PROBLEM" lists the observed malfunctions when the loader is operated.
- The column labeled "POSSIBLE CAUSES" lists all the items in the circuit which could cause the observed malfunction.

  Refer to the "Adjustments and Pressure Checks" section of this manual for adjustment, pressure checks and hydraulic test procedures.

PROBLEM	POSSIBLE CAUSES
Lift or bucket fails to operate, is slow, or has loss of power in one or more circuits.	Cylinder piston seal ring leakage.
	Valve spool leakage.
	Hydraulic pump drive defective.
	Hydraulic pump assembled incorrectly.
	Hydraulic pump worn.
	Aeration: Air entering the system between the reservoir and pump high pressure port.
	Cavitation: Restriction between the reservoir and high pressure port.
	System relief valve failure.
	System relief pressure set too low.
	System relief valve stuck open.
	Defective relief valve seals.

PROBLEM	POSSIBLE CAUSES
Cylinders leak down with control valve in neutral position.	Cylinder piston seal ring leakage. Control valve spool leakage.
Hesitation in lift or bucket when control valve spool is initially moved.	Cylinder cavitation. System relief valve stuck open. Check valve damaged or stuck open.
System noisy.	Aeration. Cavitation. Water in system. System relief valve chatter. Tubing vibration. Cold hydraulic oil (below 30º F. [-1º C.]).
Oil exhausts from breather cap.	Aeration. Cavitation. System oil overfull.
Float mechanism fails to operate or slips out of detent.	Excessive wear or broken detent components. Foreign material in detent mechanism.
Valve spools return to neutral slowly.	Spring retaining screw, detent plunger or positioner stud (return-to-dig) loose. Weak or broken spool centering springs.